

In the United States Patent and Trademark Office

Appn. Number: Not Available  
Appn. Filed: Not Available  
Applicant(s): Johs et al.  
Appn. Title: multiple element low systems & methods for low angles  
Examiner/GAU: Not Available 1324

1c811 U.S. PTO  
09/583229  
05/30/00

Mailed: With Application  
At: \_\_\_\_\_

Information Disclosure Statement

Commissioner of Patents and Trademarks  
Washington, District of Columbia 20231

Sir:

Attached is a completed Form PTO-1449 and copies of the pertinent parts of the references cited thereon.

Following are comments on these references pursuant to Rule 98:

PATENTS

Patent No. 5,757,494 to Green et al., in which is taught a method for extending the range of Rotating Analyzer/Polarizer ellipsometer systems to allow measurement of DELTAS near zero (0.0) and one-hundred- eighty (180) degrees.

Patent to Thompson et al. No. 5,706,212 teaches a mathematical regression based double fourier series ellipsometer calibration procedure for application, primarily, in calibrating ellipsometers system utilized in infrared wavelength range.

Patent to Woollam et al, No. 5,582,646 is disclosed as it describes obtaining ellipsometric data through windows in a vacuum chamber, utilizing other than a Brewster Angle of Incidence.

Patent to Johs et al. No. 6,034,777 is disclosed as it describes a methodology essentially similar to that disclosed in the present application, which is a CIP therefrom.

Patents to:

Woollam et al, No. 5,373,359,  
Johs et al. No. 5,666,201 and  
Green et al., No. 5,521,706,  
Patent to Johs et al., No. 5,504,582

are disclosed for general information as they pertain to Rotating Analyzer ellipsometer systems.

Patents identified in a Search specifically focused on the use of lenses, preferably achromatic, in ellipsometry and related systems are:

Patent No. 5,516,855 to Korth.  
Patent Nos. 5,877,859 and 5,798,837 to Aspnes et al.;  
Patent No. 5,333,052 to Finarov;  
Patent No. 5,608,526 to Piwonka-Corle et al.;  
Patent No. 5,793,480 to Lacy et al.;  
Patent Nos. 4,636,075 and 4,893,932 to Knollenberg; and  
Patent No. 4,668,860 to Anthon.



Patent No. 5,917,594 To Norton is identified as it describes use of a meniscus lens to correct for aberrations entered to an electromagnetic beam by a spherical mirror.

#### SCIENTIFIC PAPERS

A review paper by Collins, titled "Automatic Rotating Element Ellipsometers: Calibration, Operation and Real-Time Applications", Rev. Sci. Instrum, 61(8) (1990), provides general insight.

A paper by Johs, titled "Regression Calibration Method for Rotating Element Ellipsometers", Thin Solid Films, 234 (1993) is also disclosed as it describes a mathematical regression based approach to calibrating ellipsometer systems.

A paper by Nijs & Silfhout, titled "Systematic and Random Errors in Rotating-Analyzer Ellipsometry", J. Opt. Soc. Am. A., Vol. 5, No. 6, (June 1988), describes a first order mathematical correction factor approach to accounting for window effects in Rotating Analyzer ellipsometers.

A paper by Kleim et al, titled " Systematic Errors in Rotating-Compensator Ellipsometry", J. Opt. Soc. Am., Vol 11, No. 9, (setp. 1994) describes first order corrections for imperfections in windows and compensators in Rotating Compensator ellipsometers.

Papers of interest in the area by Azzam & Bashara include:

"Unified Analysis of Ellipsometry Errors Due to Imperfect Components Cell-Window Birifringence, and Incorrect Azimuth Angles", J. of the Opt. Soc. Am., Vol 61, No. 5, (May 1971); and

"Analysis of Systematic Errors in Rotating-Analyzer Ellipsometers", J. of the Opt. Soc. Am., Vol. 64, No. 11, (Nov. 1974).

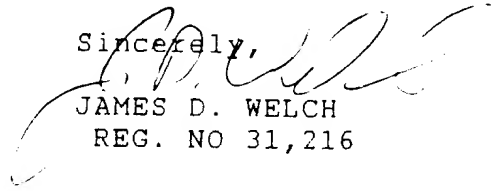
A paper by Straaher et al, titled "The Influence of Cell Window Imperfections on the Calibration and Measured Data of Two Types of Rotating Analyzer Ellipsometers", Surface Sci., North Holland, 96, (1980), describes a graphical method for determining a plane of incidence in the presence of windows with small retardation.

A paper which is co-authored by the inventor herein is titled "In Situ Multi-Wavelength Ellipsometric Control of Thickness and Composition of Bragg Reflector Structures", by Herzinger, Johns, Reich, Carpenter & Van Hove, Mat. Res. Soc. Symp. Proc., Vol.406, (1996) is also disclosed.

Another paper by Azzam & Bashara is titled: "The Influence of Cell Window Imperfections on the Calibration and Measured Data of Two Types of Rotating Analyzer Ellipsometers", J. of the Opt. Soc. Am., Vol. 61, No. 6, (Nov. 1971).

A paper by Jones titled "A New Calculus For The Treatment Of Optical Systems", J.O.S. A., Vol. 31, (July 1941).

Sincerely,

  
JAMES D. WELCH  
REG. NO 31,216